Matrix Multiplication

#matrix_multiplication

Let A be a $m \times n$ matrix, and B be a $n \times p$ matrix. The product is AB an $m \times p$ matrix, equal to:

$$AB = A\begin{pmatrix}\mathbf{b_1} & \dots & \mathbf{b_p}\end{pmatrix} = \begin{pmatrix}A\mathbf{b_1} & \dots & A\mathbf{b_p}\end{pmatrix}$$

$$\begin{aligned} AB &= \begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}2 & 0 & 0\\ 3 & 4 & 0\end{bmatrix} \\ &= \left(\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}2\\ 3\end{bmatrix} \quad \begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}0\\ 4\end{bmatrix} \quad \begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}0\\ 0\end{bmatrix}\right) \\ &= \begin{bmatrix}4 & 0 & 0\\ 5 & 4 & 0\end{bmatrix} \end{aligned}$$